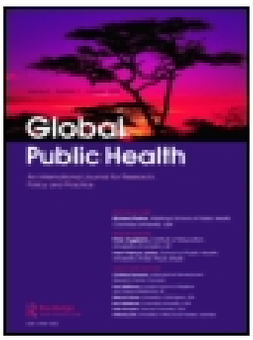

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'It has become everybody's business and nobody's business': Policy actor perspectives on the implementation of TB infection prevention and control (IPC) policies in South African public sector primary care health facilities

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ABSTRACT

South Africa is increasingly offering screening, diagnosis and treatment of tuberculosis (TB), and especially drug-resistant TB, at the primary care level. Nosocomial transmission of TB within primary health facilities is a growing concern in South Africa, and globally. We explore here how TB infection prevention and control (IPC) policies, historically focused on hospitals, are being implemented within primary care facilities. We spoke to 15 policy actors using in-depth interviews about barriers to effective TB-IPC and opportunities for improving implementation. We identified four drivers of poor policy implementation: fragmentation of institutional responsibility and accountability for TB-IPC; struggles by TB-IPC advocates to frame TB-IPC as an urgent and addressable policy problem; barriers to policy innovation from both a lack of evidence as well as a policy environment dependent on 'new' evidence to justify new policy; and the impact of professional medical cultures on the accurate recognition of and response to TB risks. Participants also identified examples of TB-IPC innovation and described conditions necessary for these successes. TB-IPC is a long-standing, complex health systems challenge. As important as downstream practices like mask-wearing and ventilation are, sustained, effective TB-IPC ultimately requires that we better address the upstream barriers to TB-IPC policy formulation and implementation.

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Tuberculosis; infection prevention and control; policy implementation; South Africa; risk perception

Introduction

Nosocomial transmission of tuberculosis (TB) is an urgent global public health problem (WHO, 2019a). While TB transmission that takes place outside of health facilities probably accounts for the majority of infections, TB transmission within health facilities represents a substantial and,

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in principle, preventable driver of TB burden (Kielmann et al., 2020). While the threat of nosocomial transmission of TB has long been recognised, public and health policy attention to this problem has grown recently (von Delft et al., 2015). There is also an increasing recognition that strong TB infection prevention and control (TB-IPC) strategies will also help prevent nosocomial transmission of other pathogens, including the novel coronavirus SARS-CoV-2 (Ehrlich et al., 2020).

TB-IPC within health facilities is therefore an important component in overall TB control efforts. The most commonly cited model for TB-IPC strategies (US CDC, 1994) identifies three main dimensions of IPC: designing health services to anticipate and respond quickly and appropriately to patients with TB in their facilities (administrative controls), improving the circulation and quality of air in a facility (environmental controls), and the appropriate use of masks and respirators (personal protective controls). Other TB-IPC models focus on a smaller set of related strategies (like the 'Find cases Actively, Separate safely and Treat effectively – or FAST – approach) or situate TB-IPC within broader frameworks such as occupational health and safety (Ehrlich et al., 2019).

Despite widespread awareness and understanding of TB-IPC measures, TB-IPC policies are often poorly implemented in health facilities across the world (Engelbrecht et al., 2018; Kuyinu et al., 2019; Shrestha et al., 2017). Too often health workers and patients do not wear masks, windows are left closed and waiting rooms are tightly packed, and patients with possible TB disease are not identified quickly or managed appropriately. Why is this, when the biological mechanisms of TB transmission are widely known and the presumed effectiveness of TB-IPC measures is not generally controversial?

van Cutsem et al. (2016) provide an excellent overview of some of the barriers to effective TB-IPC. These include lack of training, a disconnect between knowledge, attitudes and practices, lack of motivation and a sense of complacency, unclear or overly broad TB-IPC policies and procedures, insufficient resources and inadequate infrastructure, and patient flow and service delivery models that do not reduce – and in some cases, increase – nosocomial TB transmission risk. Many TB-IPC policies are also often focused on reducing transmission in TB hospital settings, offering much less relevant guidance for primary care facilities (Saidi et al., 2017). Mehtar (2008) has suggested that most TB-IPC models were developed in the global North and have not been appropriately translated to low and middle-income country (LMIC) settings. Finally, Chai et al. (2013) have noted that even in places where TB-IPC measures have been effective at reducing TB transmission, these changes took a long time and required numerous cycles of policy development and implementation.

The literature on TB-IPC thus identifies a large and remarkably consistent set of barriers to effective implementation. However, the 'causes of these causes' are not as well understood. While some of these barriers are symptoms of more general health service challenges in 'resource-poor' settings, we believe there are also more specific dynamics at play, related to TB policies and policy implementation. In this study, we wanted to better understand some of these distinctive, deeper drivers of poor TB-IPC implementation in South Africa. We spoke to 15 policy actors from various sectors to get their perspective on the forces underlying the persistent challenges to effective TB-IPC and to identify opportunities for addressing some of these dynamics. Our specific focus in this study was on TB-IPC policy implementation within clinics and other primary care facilities rather than hospitals. South Africa is increasingly offering screening, diagnosis and treatment of TB, especially drug-resistant (DR)-TB, at this level of care (Cox & Ford, 2013) and we were interested in how TB-IPC policies, historically focused on in-patient hospital settings, were being translated and implemented within primary care facilities.

Methods

Understanding a complex health problem like nosocomial TB transmission requires a complex, inter-disciplinary approach. This study focuses on policy actor perspectives on the underlying

drivers of TB-IPC policy implementation. It is part of a larger project entitled 'Umoya omuhle – Infection Prevention and Control for Drug-Resistant Tuberculosis in South Africa in the Era of Decentralised Care: A Whole Systems Approach' that includes DR-TB prevalence surveys and clinic ventilation assessments, ethnographic work at sites in the Western Cape and KwaZulu-Natal provinces, transmission dynamic and economic cost modelling, and finally systems dynamic modelling and intervention design (Kielmann et al., 2020).

We purposively selected participants for this study from across a range of levels (municipal, provincial, national, and global) and sectors (TB managers, policymakers, activists, and researchers) in order to develop a holistic understanding of the issues and the various perspectives at work. We looked for participants who had significant experience in TB-IPC policy development and implementation. Many had direct experience of South African primary care TB services, and others were more involved in TB-IPC research or global policy processes. Potential participants were identified through the project team, literature searches, and the project's Advisory Group, but were contacted directly by the researchers. CC, IK and AS conducted 15 semi-structured interviews that ranged from 45 minutes to 3 and a half hours.

Our questions addressed all stages of the policy cycle – from problem identification and policy formulation through to policy monitoring, evaluation and revision – and used an inclusive definition of 'policy' that included any guidance, frameworks, regulations, strategies, directives, and protocols that were deployed by both state and non-state actors as part of an effort to shape TB-IPC practices. We also reviewed the relevant and available policy documents for context and further illustration of ideas emerging in the interviews but we did not conduct a separate policy document analysis.

Fieldnotes and verbatim transcripts of the interviews were produced and data collection and analysis processes were iterative. Ongoing analysis discussions were held among the Cape Town-based research team. These were punctuated by larger analysis meetings with the broader author and project team at regular intervals. We used thematic analysis (Green & Thorogood, 2018) to develop both emic and etic understandings of some of the key dynamics shaping TB-IPC implementation. We also used critical discourse analysis to better understand how various policy discourses constructed the 'problem' of TB-IPC and the local health system context, and how these ideas and assumptions, in turn, shaped policy actors' interpretation of TB-IPC policy implementation. Critical discourse analysis (Blommaert & Bulcaen, 2000) looks beyond the explicit content of participants' interview responses and examines how built-in assumptions and implicit meanings in language reflect broader social patterns and ideologies. Ethical review and approval for this study was provided by the University of Cape Town's Faculty of Health Sciences Human Research Ethics Committee (#165/2018).

Evolution and current state of affairs of TB-IPC

The first question we asked our participants was to tell us the 'story' of TB-IPC policy development in South Africa as a way of understanding how they saw the evolution and current state of affairs of TB-IPC. Across our interviews, we found a consistent historical narrative with respect to when, where and why TB-IPC has emerged – and also faded – as a policy concern. Globally, the story usually began with reference to the TB outbreaks in the US in the 1980s and the development of the US CDC's 'three pillars' model (1994) of administrative, environmental and personal protective controls. There is then a long period of TB-IPC neglect between these earlier outbreaks in the global North and the outbreak of XDR-TB in Tugela Ferry, South Africa in 2005 (Gandhi et al., 2006). There was a consensus that 'Tugela Ferry' was *the* critical focusing event in South Africa, leading to a new burst of concern and policymaking around TB-IPC, culminating globally in the WHO's (2009) IPC guidelines (largely based on the CDC's framework) and a series of South African National Department of Health (NDoH) TB programme policies in the late 2000s.

Our participants also described, however, how this burst of attention died down relatively quickly, with little impact on further IPC policy formulation or improved implementation. One participant argued,

> Around the time of the Tugela Ferry outbreak, there was a lot of discussion around infection control … [there] was obviously a lot of work that went into policy development and … implementing them. But there hasn't been the same impatience [since]. I think even some of the policies are questioned [now], about where the resources are [for TB-IPC].

Several participants did note, though, some more recent interest in TB-IPC in South Africa related to concerns around multidrug-resistant TB (MDR-TB) and the decentralisation of TB services as well as some PEPFAR-funded efforts to improve and integrate TB and HIV services.

Participants across various levels and sectors also painted a remarkably consistent picture of widely varying implementation of TB-IPC measures, with the majority of facilities doing a poor to very poor job. Participants described a proliferation of TB-IPC policy messages from a wide variety of sources that were insufficiently concrete, prioritised or practical. They argued that TB-IPC policies were still too hospital-centric to be useful in busy PHC clinics and that facilities rarely if ever had dedicated IPC budgets. They gave numerous examples of masks and respirators either not being available or not being used, even in the Tugela ferry MDR-TB wards shortly after the outbreak. Several managers and activists also described the 'performative' use of personal protective equipment (PPE), with health workers quickly donning masks for visiting health managers, international researchers, or quality assurance auditors.

Participants with experience in primary care clinics described TB-IPC discourse and practice within these facilities as overly centred on mask-wearing and the importance of open windows (whether or not practised), with much less attention to patient flow, cough triage, waiting room management, or the role of early diagnosis and early, appropriate TB treatment. They also noted a strong association between fears of DR-TB and TB-IPC practices. Several participants described how the arrival of a patient with DR-TB would often trigger sudden mask use at the clinic and isolation of the patient, in turn, associating mask use only with DR-TB. These sudden reactions conveyed the message that people with DR-TB represented an acute and distinctive risk and that masks were meant to be used around only this 'most dangerous' of patients, deepening the inter-related stigmas of DR-TB and mask use.

At the policymaking level, participants generally felt that TB policymaking and programmes were far too focused on drugs and diagnostics and that TB-IPC was constantly neglected. Several also noted the fact that TB's status as an 'ancient disease' and one of long-standing concern in South African health policy led to perceptions that TB was not treated as a priority and was indeed thought to exist 'in the background' for most people. They also argued that this lack of a sense of urgency led TB policymaking communities and practices to be inflexible and uncreative. When new TB-IPC policy developments were noted, they were often described as driven by high-level political pressure, such as the demand for an updated national TB-IPC policy document in time for a World TB Day announcement to address short-term concerns and priorities of global donors.

This picture of TB-IPC neglect, from higher level policymaking down to clinic-level policy implementation, is consistent with the large literature noted above that documents the many barriers to effective TB-IPC policy development and implementation (van Cutsem et al., 2016). The question remains, however, about what underlying forces produce this state of affairs, especially in light of the general recognition of the dangers of nosocomial TB transmission and the lack of debate over what measures, in the abstract at least, might reduce this transmission. In the next sections, we identify four key drivers of poor TB-IPC policy implementation.

'Everybody's business and nobody's business': Institutional and conceptual fragmentation

One of the most consistent explanations from participants for poor TB-IPC implementation was the way in which TB-IPC had 'become everybody's business and [therefore] nobody's business'. Each of our participants described a lack of 'stewardship', 'ownership', 'leadership' or 'political will' in relation to TB-IPC, despite widespread concern around nosocomial infection. A key driver

of this state of affairs appeared to be the many ways in which the institutional stakeholders meant to be responsible for TB-IPC were dispersed across multiple domains, resulting in policy overlaps, ambiguities, gaps, and a general state of confusion and inertia.

This fragmentation is evident in the many different units of government that are in some way responsible for TB-IPC. Even within TB control programmes, where one might expect more coordination and coherence, TB-IPC policy formulation was described as often highly internally fragmented. At Provincial and National levels, for example, the drug-sensitive and drug-resistant TB programmes have been, until recently, separate and have tended to develop IPC policies in parallel. TB hospitals still have outsized influence on how TB-IPC is conceptualised and managed as a problem, leaving clinics to develop their own approaches. In the Western Cape, TB has historically been the responsibility of municipal health authorities. The drive to expand TB services has meant, however, that the Provincial department now also offers many TB services, but these are managed largely in parallel with City services.

The TB programme's relationship to other programmes and departments is similarly fractured. TB nurses who develop TB disease, for example, must typically seek care at the occupational health units in their district. These units, though, often do not coordinate with the local TB programme (either in terms of policy, or treatment, or monitoring and evaluation). TB-IPC policy development is also often closely connected to more cross-cutting IPC policy development processes, which are usually driven by quality assurance, patient safety, or primary care services departments (with little engagement with the TB programme). While TB-IPC policy within these various units were generally perceived to be reasonable, the cumulative effect is that the TB programme, the quality assurance department, and the occupational health unit, among others, all have poorly coordinated, often different, and sometimes even conflicting IPC approaches.

Other key disconnects occur between the Department of Health, the Department of Public Works (which controls building maintenance, construction and renovation), the Department of Labour (which negotiates working conditions and occupational health and compensation policies), and the health professional associations (which regulate scopes of work and provide continuing professional development). Each of these organisations have their own policy approaches to TB-IPC but rarely coordinate effectively with each other. Even within single clinics, where the staff complement may be very small and working closely together, participants with experience in these settings said that the 'TB nurse' is often exclusively tasked with implementing TB-IPC measures (or sent to TB-IPC training), without the involvement of other nurses in the same clinic. In other cases, they described how a nurse may be appointed as the 'IPC nurse' for a clinic but have no concrete involvement with the TB nurse or TB services.

Underpinning the *institutional* fragmentation of ownership for TB-IPC was a persistent *conceptual* ambiguity around how to think about what TB-IPC is and where it fits within the broader TB programme and health system. There was a consistent disconnect in our interviews, for example, between framings of TB-IPC as an occupational health problem versus TB-IPC as a patient-focused TB transmission problem. We interviewed several passionate advocates for an occupational health approach to TB-IPC who argued, convincingly, that this was a critical and neglected health and human rights issue for healthcare workers. Their frame of reference, however, rarely included patient safety as part of the equation (and when they did, it appeared as an aside). Other participants focused on clinics as critical drivers of TB infection, especially DR-TB infection, among patients and, in turn, among the general population, but paid little attention to the risk to healthcare workers. Similar disconnects were seen in the ways at-risk health facility staff were understood, implicitly and explicitly, as being limited to doctors and nurses.

TB-IPC practices also tended to be narrowly construed, with a focus on the prevention of direct exposure to airborne bacteria (e.g. with respirators and ventilation), typically leaving those working in TB diagnosis and treatment and in other parts of the clinic out of the prevention frame. Several participants argued that the treatment-as-prevention paradigm (Nathavitharana et al., 2019) was much more firmly established in the field of HIV as compared to TB, and that this was a critical

missed opportunity. Finally, a common theme among participants with programme management experience was the need to broaden the framing of TB-IPC and understand it as part of 'respiratory hygiene' or 'airborne infection control' (without at the same time letting it get lost amid all infection control issues).

Participants across a range of levels also described, however, consistent institutional pushback at efforts to promote more coherent and integrated models of TB-IPC. Different sectors – DR-TB programmes, clinic TB nurses, occupational health units, quality assurance initiatives, etc. – were described as tending to always develop their own IPC concepts, strategies and priorities: 'Each and every unit wants to have their own policy'. The result was a proliferation of overlapping and potentially contradictory policy messages with little sense of conceptual coherence, institutional alignment or strategic prioritisation.

The inability of TB advocacy to frame and sustain a crisis

Even if policy actors have clear ideas about what TB-IPC is, who is responsible for it, where the risks are and how to handle those risks in each context, this would likely be insufficient to produce lasting changes in policy and practice. Many policy changes, especially ones that entail difficult shifts in practice, require sustained engagement and pressure from the relevant interest groups (Agartan, 2015). A consistent theme across our interviews, however, was the general lack of TB activism, or even broader mobilisation among civil society actors, to address TB concerns. The global picture appeared quite similar to participants working outside of South Africa. If anything, TB activism in South Africa was described as strong when compared to the experience in TB activism in other countries or among global institutions but dramatically weaker than the HIV activism that has dominated health politics in South Africa over the last 15 years.

The distinctive tone and approach of TB activism could be most concretely seen in the constant reference in our interviews with policymakers, clinicians, managers, and activists alike to the notion of 'advocacy' as opposed to 'activism'. Our interview questions used the term 'activism' but almost all of our participants responded in the language of 'advocacy'. One participant even highlighted this shift in terminology explicitly, contrasting advocacy and activism and arguing that in the 'TB world', advocacy seemed 'more elegant' and was the preferred concept. Several other participants explained that advocacy referred to approaches that were more collaborative and worked from the inside, with less of the 'shouting' and 'toyi-toying' (a South African protest dance) that they associated with HIV activism.

A consequence of this more tempered approach to the politics of policy engagement could be seen in the ways TB advocates said they struggled to generate and maintain a sense of urgency around the prevention of TB transmission. While participants felt that DR-TB is widely perceived as an urgent problem, they pointed out that DS-TB treatment is generally thought to be accessible and effective and that the threat of TB was seen to be 'ancient', persistent, and thus an inevitable part of the 'background', reducing the collective sense of emergency. One participant argued that TB is perceived in fact as an 'isolated emergency', limited to certain geographic spaces and social classes, rather than as a truly *public* health emergency.

Another key feature of South African TB advocacy is the fact that the most vocal proponents of improved TB-IPC policies are NGOs like TB Proof, which are composed primarily of medical professionals and researchers who bring a strong occupational health (OH) perspective to the issue. While the OH lens does provide a powerful analysis of, and set of potential solutions to, the problem of occupational risk of TB (Ehrlich et al., 2019), we have noted above how those deploying an OH framing of TB-IPC have also struggled to meaningfully incorporate the questions of patient safety and community health into their advocacy. Initial campaigns by TB Proof, for example, initially focused only on doctors, then nurses, and only more recently on clerks, cleaners and other facility staff. Nosocomial transmission to patients was generally not the primary object of concern in most of the TB advocacy efforts. It is thus perhaps unsurprising that TB advocacy also seems to lack a

substantive grassroots component in South Africa, in contrast with HIV activism and its broad-based mobilisation of patients and communities in South Africa.

Also missing from TB activism have been the health worker unions. Mineworker unions played a key role in the development and implementation of TB policy (for their sector) in South Africa (Murray et al., 2011), but one participant pointed out that their impact was enabled by a mobilised membership with a clear class critique of the mine owners, a parallel engagement in the struggle against apartheid, and concrete (and concretely unjust) drivers of TB transmission (terrible working conditions, under-nutrition, over-crowded hostels, little access to healthcare, etc.). Health worker unions come at the problem of TB from a significantly different angle. As one participant put it, at the end of the day, 'you are a nurse first' and your demands as a worker must come second to that. This dilemma is quite visible in the formal objectives of many HCW unions, which include both registration, professional education and continuing professional development work as well as collective bargaining for higher wages and benefits and better working conditions.

Our participants made a clear and convincing case that TB advocates have struggled to generate and maintain a sense of crisis, especially around TB-IPC, they lack a broad-based foundation of support at the grassroots level, and their more collaborative and less confrontational approach has limited their capacity to drive policy change and implementation.

Policy actors in search of evidence

Just as policy advocacy – or activism, depending on one's approach – can be an important driver of policy formulation and implementation, the production, circulation and consumption of evidence can also be a critical lever for policy change (Cookson, 2005). In our interviews, we asked what urgent TB-IPC policy questions and debates were on the table and what role scientific evidence played in these discussions. The production and politics of evidence can be critical in shaping health policy, in often complex ways (Parkhurst, 2017), so we were surprised to hear participants across the board speak about both the lack of evidence for TB-IPC strategies (new evidence or old) as well as a (relative) lack of contentious TB-IPC policy questions in need of answers from scientific research.

Participants described how the lack of evidence about actual nosocomial transmission risks and about the effectiveness of IPC measures was largely the result of a set of fascinating and intractable methodological dilemmas. For example, how would researchers practically and ethically measure actual TB transmission events in clinics (as opposed to all other settings) since transmission can't be identified in the moment, unless researchers were to intentionally expose research participants? How would researchers generate sufficient sample sizes to discern the effect of interventions when TB transmission is an important but relatively rare event? If they could identify transmission events in a sufficiently large number of people, how would they identify an appropriate set of controls, and how could they isolate out the many possible components of IPC practice and correctly attribute effects to specific IPC measures? Traditional epidemiological techniques are not able to address most of these dilemmas. The quite simple and stripped-down experiments that are able to assess IPC measures to some degree – measuring air flow rates in waiting rooms or exposing caged guinea pigs to clinic air – are, despite their serious limitations, some of the best, and indeed only, evidence for the effectiveness of certain IPC strategies (Dharmadhikari et al., 2011).

This lack of direct evidence for TB-IPC interventions is an old and well-recognised problem in TB-IPC policy but not one that seemed to weaken the general faith in IPC measures, especially among policymakers and programme managers. One participant, for example, claimed confidently that administrative controls are the most important and effective of the three types of TB-IPC controls, and followed this claim up immediately by acknowledging that there is, however, no evidence to support this claim. There was some interest expressed in having evidence that would provide guidance on more fine-grained issues of prioritisation, potential impacts, and resource requirements of specific TB-IPC measures. One participant noted, for example, that the marginal utility of using UV

sterilisation lights in a clinic that already had good ventilation was probably very low, but evidence demonstrating this would be useful. Again, however, these did not seem to be urgent policy questions in search of evidence. And yet, at the same time, many also spoke about the ongoing 'need for evidence'. One participant spoke about the lack of TB-IPC evidence as a 'significant data vacuum' and another described it more forcefully as a sign of 'gross neglect' of the problem by the global TB community.

TB advocates did speak more concretely about the public health and political power of routine surveillance of patterns of nosocomial risk and transmission. They lamented the fact that no university appears to keep a register of medical students who develop active TB. They said that many provincial health services do not keep records of occupationally-acquired TB cases and that many health workers also seek treatment in the private sector. Several participants did note more optimistically that the WHO has recently begun collecting country-level data on TB infections among healthcare workers and one hoped that this 'shameful data point' might at least spur some efforts to address the issue in countries with poor indicators. Most of these nosocomial infections would of course have to be inferred (in relation to 'background' rates of TB infection) but advocates pointed to the important role of these kinds of registries in making the crisis feel real.

Finally, some participants felt that having 'new' evidence served an important rhetorical function. They spoke about the current power of the concept of 'evidence-based policymaking' in their fields, and their belief that increasingly, if you want new policy, you have to offer new evidence. Here again, the specific policy questions being answered were less critical than the persuasive impact of having new evidence to bring to an old question. Across our interviews, therefore, the assessment of the role of evidence in TB-IPC policy implementation was complicated. No urgent debates were identified and participants seemed to trust the general logic of TB-IPC strategies. But they also recognised the practical importance of evidence in refining policy options and documenting public health burdens as well as the political and rhetorical importance of evidence for making the problem feel real and lending credibility to the policy options on the table. The methodological limits to such evidence, however, meant that evidence production, like TB advocacy, often failed to contribute substantial momentum for TB-IPC policy implementation.

Professional cultures: Medical hierarchies and TB risk perceptions

Along with institutional fragmentation, the weakness of TB activism and the ambiguities of evidence for TB-IPC, our participants also noted the impact of local clinical contexts on TB-IPC policy implementation. They often began by describing the significant challenges public sector clinics face. Clinics were generally described as having persistently high workloads, chronic staff shortages, competing (or contradictory) policy priorities, and the constant presence of urgent patient care (that always seemed to crowd out TB-IPC awareness and practice). Health worker relationships were described as extremely hierarchical, both between patients and HWs and between different categories of HWs, making any effort to shift IPC practices or norms within a clinic exceedingly difficult unless driven by those at the top. TB service design and delivery was described as highly institutionalised and routinised and lacking an awareness of the distinctive needs of different sub-populations and the potential value of different service delivery models. TB was also described in many settings as a stigmatised (and stigmatising) service. While several participants noted some nurses 'love TB' and relish their ability to cure patients of a deadly disease, they also told many stories about nurses actively avoiding TB duties or being assigned to TB wards as a disciplinary measure or because they lacked seniority. Finally, IPC policy implementation was described as often actively neglected (though not as stigmatised) with one participant arguing that in many cases, 'if you have a pulse, you are the infection control nurse. And oftentimes, no training. And no IPC budget either'.

Partial blame for this neglect of IPC was traced by many participants back to the culture of professional training in South Africa for doctors and nurses. Participants with clinical backgrounds offered numerous examples of professors shaming medical students who wore masks or who

asked if they were available, universities failing to acknowledge nosocomial TB risk for students or develop any policies for preventing or even documenting these infections, and medical and nursing professors claiming they were immune to TB since they had worked in the wards for years and never wore a mask. A medical culture of invincibility along with the underlying rigid and steep hierarchy in South African health professional training contexts made challenges to these practices very difficult. Across our interviews, the picture emerging was that TB services remain fairly stigmatised in many settings, undercut by powerful professional and patient-provider hierarchies, and have a long history of quite routinised and inflexible service design and delivery.

Our participants also described complex psychologies and sociologies of risk perception within daily clinic life. For example, participants argued that TB risk is seen by many health workers as everywhere, and therefore (in practice) as nowhere. They felt that the pervasiveness of TB risk, not only in clinic spaces but also in homes, on public transport and other public spaces, made it difficult for HWs to identify and prioritise TB risk in different spaces in day-to-day practice, or to know when TB-IPC measures had been effective. They also noted dynamics of 'strategic denialism', 'learned helplessness' and/or a sense of 'fatalism' among health workers when it came to their risk perceptions. Many participants argued that health workers understand the TB risks they face but too often feel powerless to address them. We also heard stories, though, about how many health workers held a belief in – and strong valuing of – toughness as well as a sense that long and successful service in TB programmes might imply a sense of invulnerability to infection. Several participants even spoke about the shock with which TB staff received the results of their own positive diagnosis for TB, as if the possibility of getting TB themselves had truly not occurred to them.

Our participants also noted a persistent but misguided tendency throughout the health system – frontline health workers and management alike – to locate TB risk in TB 'spaces' such as TB wards, TB waiting rooms, TB consulting rooms, and not in the general waiting areas or other services in the facility. We heard numerous examples of how TB-IPC measures tended to be associated with TB-related spaces, or patients actively suspected, or diagnosed with TB. The sudden use of masks when a diagnosed MDR-TB patient came to the clinic (described above) captures perfectly this misperception. Patients with active, undiagnosed and thus transmissible TB were, our participants argued, most likely to be found not in the TB wards but in other parts of the clinic, presenting with other complaints, or coming with TB symptoms but not yet diagnosed. Our participants were uniformly concerned about the consistent and pervasive misidentification of non-TB areas as ones of low risk.

A couple of participants noted that this blind spot around where TB infection risk was actually located could also be seen in the ways the decentralisation of TB services was (inappropriately, they felt) fuelling increased concerns around TB-IPC. They described how the decentralisation of DR-TB services to the primary care level had raised concerns among staff and the public that TB patients would 'now' be coming to clinics for diagnosis and treatment and that their presence in these clinics represented a new, and often poorly managed threat of TB infection. These participants argued that, again, the exclusive association of TB risk with TB spaces, TB services and TB patients was misguided, and that clinics were always already significant spaces of risks for TB transmission from undiagnosed and/or untreated patients in the general clinic population. They were not suggesting that TB services or TB patients in treatment do not carry transmission risks but only that this significant source of transmission risk has been consistently been left un-recognised.

The complex array of risk perceptions described above were not only individual psychological phenomena. They were also socially produced and reinforced. Participants described, for example, the ways in which the lack of line item funding for IPC, or lack of IPC training for non-TB staff, or insufficient stock of IPC supplies like respirators sent quiet but powerful messages about where the health system believed HW risks and priorities lay. Similarly, clear rules, consistent enforcement of IPC regulations, and adequate provisioning of supplies communicated health system commitment to IPC and the wellbeing of staff. They also felt that clear enforcement and support practices increased the perceptions among health workers that TB risk was in fact a clear and present danger.

What works to address these barriers to TB-IPC?

Across our interviews, a fairly coherent picture emerged, of widespread neglect of TB-IPC in both policy and practice, as well as a wide range of barriers to more effective and consistent TB-IPC measures. Few if any of these reported barriers had anything to do with the complexity of TB-IPC practices, lack of faith in their effectiveness, or misunderstandings about how TB transmission worked. Rather, our participants described numerous ways in which the health policy and systems context itself worked against effective TB-IPC policy formulation and implementation. These included: the ways in which institutional responsibility and accountability for TB-IPC were dispersed across the health system (and beyond); how advocates for improved TB-IPC struggled to convince the wider health system and public that TB-IPC was an urgent and addressable policy problem, and mobilise a strong enough coalition to push this up the policy agenda; how policy innovation was hampered both by a lack of evidence, but also by a policy environment that relied too often on 'new' evidence to develop and justify new policy; and the ways in which professional medical cultures steeped in rigid social hierarchies and skewed TB risk perceptions served as a crucial barrier to the accurate recognition of and response to TB transmission risks across the health system.

However, this picture of significant policy neglect in general was often complemented by specific examples of places where TB-IPC was working, pockets of entrepreneurial policy innovation where the many barriers to TB-IPC described above had been overcome. Stories about these local-level innovations most often described initiatives driven by 'champions', a term that is used in both the policy analysis literature and common discourse to describe individuals who through their own combination of personality, intelligence, charisma and/or willpower, make things happen that otherwise would not have happened. We heard numerous stories about clinic managers who had made a difference within their facility by driving new norms around IPC, or small groups of medical students who had banded together to force their universities to develop IPC policies. We heard about a senior engineer at the parastatal Council for Scientific and Industrial Research (CSIR) who had led important work on building design and extractor fan technology in response to the Tugela Ferry outbreak. And we heard about pilot projects from municipal TB programmes to develop new kinds of personal protective equipment (in this case, a repurposed 'buff', a tube of lightweight material worn around the neck and lower half of the face, often used by hikers and cyclists) and the development of new tools for auditing IPC risks and practices over time.

In other cases, local innovation was more of a collective effort. Clinics in Khayelitsha, a community that has a long history of HIV mobilisation and a relatively well-resourced and well-managed sub-district team (Barker, 2015), were described as consistently doing well in TB-IPC. A number of other individual city clinics in Cape Town were identified as models of TB-IPC, often after long, supportive intervention by facility managers and trainers to reinforce new norms. Some clinics in the North West province were also described as doing well, largely because of the presence of TB research projects, and the added support, intervention and scrutiny those projects brought with them. And activist groups like TB Proof or MSF were applauded for establishing new norms in the facilities where they worked.

Whether participant's narratives of local success centred on an individual 'champion' or on more institutional actors, they described those sites with the best IPC practices as the ones where individuals and organisations had worked hard to establish and then maintain new social norms around IPC. The critical lesson here is that this type of re-norming took time, effort and consistency, and required concrete policy implementation guidelines along with ongoing supportive reinforcement and supervision around key IPC priorities and practices (Grimshaw et al., 2001; Rowe et al., 2005). TB-IPC also emerged as a policy problem that was inherently a complex health systems problem (van der Westhuizen et al., 2019), not one that could simply be resolved through a new national policy document or a tight focus on specific practices like mask-wearing (important as both of those things might also be).

It is important to note that these kinds of positive changes in clinic norms and practice were only described to us as happening at the clinic level or above, and not (1) among individual or smaller units within a clinic, and (2) not beyond the district level. This leads us to two further conclusions. First, as a complex health systems issue, change in TB-IPC practice is something that has to include the whole facility as well as broader sets of actors (since it requires the effective alignment of staff, management, patient flow, infrastructure, budgets, etc.) (Bisht, 2019). Making it the problem of the TB nurse, or the IPC nurse, within a facility will always be insufficient (Zinatsa et al., 2018).

Second, the lack of success with TB-IPC, except among certain well-run and well-resourced districts, highlights the need for both improved district-level support across the country (Dookie & Singh, 2012) as well as the need for (till now, largely absent) provincial and national leadership around TB-IPC. If we take seriously the lessons above about the importance of constant reinforcement and support for new TB-IPC norms, then the district is where most of that ongoing, close contact work has to happen. Providing more focused support for a district-based approach to TB-IPC might help address some of the system- and policy-related barriers we have described above.

This is not a substitute, however, for provincial and national leadership and management. The power of and need for policy signals from 'above' was in fact a recurring theme in our interviews. One of the most common terms used by our participants was that they were 'waiting' for a new and better policy to arrive and provide direction and energy to TB-IPC efforts. The primary objects of policy anticipation were the pending National guidelines on occupational health and IPC, in development for several years now, as well as the draft Western Cape Provincial IPC policy, and the new WHO IPC guidelines (which did arrive in 2019 (WHO, 2019b)).

While policymakers and programme managers at national and provincial levels cannot provide the kind of close supervision and support required to change TB-IPC norms over time, they can send clear signals about priorities and strategy by developing clear policy guidelines and principles, budgeting adequately in support of TB-IPC, and mandating and enabling engagement within and across the relevant departments. Also important are strategic adjustments in health information systems and quality control processes that would improve the routine collection of meaningful IPC indicators and enable proper assessment and accountability for TB-IPC. One participant pointed out, for example, the fact that many countries now report the number of occupationally-acquired TB among health workers in their WHO country reports (WHO, 2019a) is a simple but critical intervention, one that could give TB advocates crucial leverage for mobilising attention to and support for IPC (Colvin, 2014). These kinds of evidence-informed strategies have played a key role in, for example, the fight for HIV treatment access and attention to non-communicable diseases (Epstein, 1996). Initiatives like these at the country level and below may hold similar promise.

Conclusion

The novel coronavirus pandemic arrived just as we were writing up the results of this policy analysis and it has proven to be an instructive contrast when thinking through our interviews. Mask-wearing, at least in the South African context, and most settings besides some countries in Asia, has typically been stigmatised, and thus not often practised, among the public and health staff alike (Syed et al., 2003). Mask-wearing may not only reinforce felt and enacted TB stigma (as suggested in our findings above) but can also affect more broadly patients' dignity and social status in their day-to-day lives (Abney, 2018). Now, however, we are seeing state-enforced mandates for the general public to wear masks in a wide range of settings. This new norm has not been readily accepted in all quarters (Greenhalgh et al., 2020), but in relation to COVID-19, there is certainly a widespread willingness to endure, at least for a while, mask-wearing as a common feature of social life. The willingness to adhere to strict IPC measures appears to be very high within health facilities themselves. This is a kind of willingness to avoid transmission of a deadly disease that always felt in very short supply in our participants' stories about TB-IPC.

There is one important way, however, in which COVID-19 IPC practices look similar to those for TB – in the tendency to see COVID-19 IPC as a technical challenge and focus in narrowly on COVID-19 transmission and on the specific techniques and equipment required for effective IPC. Right now, with the dramatic sense of crisis lending focus to responses to the pandemic, we are seeing a dramatic shift in norms and practices – not among everyone, of course, but still, a far more sudden and profound shift in health practices than we have ever seen in our lifetimes. Whether or not this shift will be sustained as the pandemic is inevitably normalised, however, will depend on our ability to see COVID-19 through a health systems lens and recognise the many changes, big and small, that we will have to make, and then consistently reinforce, if we are to keep IPC awareness around COVID-19 from slipping into neglect. Our current successes in slowing the transmission of COVID-19 may be short-lived if we do not find ways of embedding these changes within the broader health system. Can we capitalise on COVID-19 as an opportunity to reimagine IPC for all airborne infections – not to focus exclusively on masks, because correct and consistent mask-wearing will surely prove very hard to sustain, but rather to think about systems that work with those who use them to reduce transmission risk?

Data availability statement

The data that support the findings of this study are openly available in Zivahub at zivahub.uct.ac.za.

Disclosure statement

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